which take place in the uterus during utero-gestation, and observes, first, that there is no similarity between the fibres of the round ligament and those of the unimpregnated uterus, the latter being made up of spindle-shaped nucleated fibres, contained in a matrix of exceedingly coherent granular matter; that these fibres are best examined in portions which have been broken up by needles, in preference to thin sections; and that this tissue is well seen in the larger mammals, as in the Cow, &c. In the impregnated uterus the fibres are found much increased in size and distinctness, but devoid of nuclei and comparatively loosely connected; and the enlargement of these fibres is of itself sufficient to account for the increased volume of the gravid uterus, without supposing that a set of muscular fibres are formed in it *de novo*.

Hence he reasons that the unimpregnated uterus consists probably of little more than an assemblage of embryonic nucleated fibres, inactive until the ovum is received into it, after which their development commences and continues simultaneously and progressively with that of the fœtus; so that when this last has arrived at a state requiring to be expelled, the uterus has acquired its greatest expulsory power. Lastly, the author observes, since the fully-developed fibres cannot return to their former embryonic condition, they necessarily become absorbed, and a new set of embryonic fibres are formed for the next ovum, so that each fœtus is furnished with its own set of expulsory fibres; which view is in perfect accordance with the statements of Drs. Sharpey and Weber, with regard to the membrana decidua.

April 18, 1850.

The EARL OF ROSSE, President, in the Chair.

Robert Stephenson, Esq., was admitted into the Society.

The following papers were read:—

1. "On the Solution of Linear Differential Equations." By the Rev. Brice Bronwin, M.A. Communicated by S. Hunter Christie, Esq., Sec. R.S.

The methods employed in this paper to effect the solution or reduction of linear differential equations consist of certain peculiar transformations, and each particular class of equations is transformed by a distinct process peculiarly its own. The reduction is effected by means of certain general theorems in the calculus of operations.

The terms which form the first member of the first class of equations are functions of the symbols ϖ and τ, the latter being a function of x, and the former a function of x and D, x being the independent variable. This member of the equations contains two arbitrary functions of ϖ, and may therefore be of any order whatever. It likewise contains two simple factors, such for example as ϖ and $\varpi+nk$, which factors are taken away by the transformation em-

ployed, and consequently the equation is reduced an order lower; it is therefore integrated when of the second order. There is a series of equations of this class, each essentially distinct from the rest, yet all reducible by a similar process.

These equations contain two arbitrary functions of x. The number therefore of particular practicable forms, which may be deduced from each, is very great, a circumstance which renders our chance of putting any proposed equation under one of these forms greater in the same proportion. On account of the very large number of particular integrable equations which each general example furnishes, selection would be very difficult, and all could not be given; the author has therefore refrained from giving any.

The second class of equations may be deduced from the first by the interchange of the symbols D and x, and changing τ into τ^{-1}. The second general theorem can be deduced from the first in like manner; and this class may be transformed and reduced by it in a manner exactly similar to that by which the former class is reduced by the first general theorem. The solution therefore of the one series may be deduced from that of the other by the interchange of symbols only. But in the second series the solutions obtained are not always practicable, that is to say, they cannot always be interpreted in finite terms. They have therefore been reduced by the introduction of new arbitrary functions of D, which render them practicable; this process however necessarily diminishes their generality.

When reduced to the ordinary form, these equations are somewhat complicated; but by giving suitable forms to the arbitrary functions of D which they contain, we may derive from them particular examples of a form as simple as we please, and by introducing as many arbitrary constants as possible, these examples may be made very general of the class to which they belong. In the integration of linear equations, the coefficients of which are integer functions of x, they may prove very useful.

Next, an equation, a particular case of which was treated by Mr. Boole in the Cambridge Mathematical Journal, is here integrated under its most general form. Instead of integer functions of x, the coefficients may be any functions whatever, consistent with the condition of integrability, which is ascertained, and the formulæ of reduction assumed by Mr. Boole are shown to be universally true. An additional function of the independent variable is also introduced into the operating symbol π. The equation therefore, independently of the condition of integrability, contains two arbitrary functions of x, and consequently gives rise to a considerable number of particular integrable examples.

Here also the interchange of the symbols D and x is made, both in the equation to be integrated and in the general symbolical theorem by which it is reduced, and the same reduction to practicable forms as before is likewise made.

The next class of equations results from the generalization of another equation integrated by Mr. Boole in the Cambridge Mathema-

tical Journal. Here the symbol D of Mr. Boole is replaced by the general symbol ϖ, and moreover the first member of each equation contains two arbitrary functions of ϖ; and by means of another extension, this example gives rise to a whole series of equations constituting a class. The reduction is effected partly by the first general theorem in the calculus of operations, and partly by other means. It must be observed that each of the classes is totally distinct from the others, and its mode of treatment also distinct; also each of the general examples in the series contains two arbitrary functions of the independent variable, and will therefore give the solutions of a large number of particular equations, but for the reason before stated particular examples are not given.

Here likewise, by the interchange of the symbols D and x, another series of equations with their solutions or reductions is obtained, and also another general theorem by which they may be transformed and reduced. But the solutions of the examples of the one series may be deduced from those of the other by the interchange of symbols. It is not a little remarkable that this interchange of symbols in all these cases should be found possible, it will however be found possible in another case to be hereafter described.

The last class of equations discussed in this paper is transformed by means of a general theorem of a very different kind from any of those which have been employed in reducing and integrating any of the previous classes. By means of this transformation, the symbol ϖ, of which the first member of these equations is a function, is placed in a position to operate upon the whole of that member, a certain equation of condition among the coefficients being previously admitted. Hence by operating upon both members with the inverse of this symbol, the equation is once integrated, and, if it be of the second order only, completely solved.

Here too the interchange of symbols may be made both in the equation and its solution, and the solution so changed will be the solution of the equation changed in like manner. The general symbolical theorems, which here consist of a series of terms, may be derived the one from the other in the same way, and by changing the signs of the alternate terms.

Reductions of the arbitrary functions of D, similar to those before made, are made here also; and by particularizing some of the functions so reduced for the sake of simplification, several very singular resulting equations are obtained. If in these we assign to the remaining arbitrary functions, particular forms, and introduce as many arbitrary constants as we can, we may find particular examples which may be of great use in the integration of equations with coefficients containing only integer functions of x.

By a very obvious substitution an arbitrary function of x may be introduced into any of this kind of equations, and also another function of D, and the last often with great advantage.

2. "On the Oils produced by the action of Sulphuric Acid upon various classes of Vegetables." By John Stenhouse, Esq., F.R.S.